

Road Networks

Roads disturb the natural environment by compacting soil, increasing surface runoff, and promoting erosion. On a game ranch, road placement therefore requires careful planning, with clear consideration of each road's purpose and impact. Three main types of roads are typically found on a game ranch (Du Toit & Van Rooyen, 2002).

Tourist roads are designed to enhance scenic and wildlife viewing experiences. These roads should avoid long straight sections and instead follow natural contours or ecotones, which are transition zones between vegetation types. Optimal game-viewing roads are located in open veld, approximately 100 m from denser vegetation. Tourist roads usually connect waterholes, traverse multiple veld types, and may also serve for patrols and animal capture.

Firebreak roads must be at least 8 m wide to prevent the spread of accidental fires. They should separate major veld types to support effective veld management and controlled burning. Where specifications are met, firebreak roads may also function as tourist roads.

Hunting roads are typically winding, dual-track routes designed to minimise disturbance while remaining easily navigable. Their primary function is to allow the efficient transport of hunted or captured animals to processing or holding facilities, and they are mainly used during the hunting season.

Ecological Effects

The ecological impacts of roads depend largely on their design and location (Du Toit & Van Rooyen, 2002). Road construction can destroy vegetation, particularly trees, and displace small animals. Poor planning may result in erosion and habitat degradation. Firebreaks often serve as escape routes during veld fires, while roads are commonly used by animals as movement corridors between grazing and water sources.

Certain species rest on roads during rainy or moonless nights, increasing the risk of vehicle collisions. Culverts may be used as dens by various animals, while roadside vegetation often attracts herbivores. Roads can also alter animal behaviour, restrict movement of sensitive species, reduce grazing through vegetation thickening, and pose safety risks due to vehicle traffic, smooth tar surfaces, and night-time visibility issues.

Road Construction

Prior to construction, all rocks, stumps, roots, and vegetation must be removed from the road alignment and a strip at least 5 m wide on either side, to a depth of 75 mm. Vegetation removal is essential, as decomposition weakens the road structure. Roads typically consist of two to four layers, including a surface layer, supporting layer, selected soil layers, and the road base. Topsoil removal depends on soil quality and design requirements and should be stored separately for later rehabilitation of road verges and disturbed areas (Du Toit & Van Rooyen, 2002).



Roads can contribute to landscape fragmentation and ongoing wildlife mortality through vehicle collisions. There is concern that roads may act as habitat sinks, drawing animals into high-risk areas (Du Toit & Van Rooyen, 2002).

Drainage

Road drainage must address both surface and subsurface water. Surface drainage involves directing rainwater away from the road through a convex surface, drainage channels aligned with slopes, and culverts that allow water to pass beneath the road. Aligning roads with natural contours improves drainage efficiency.

Subsurface drainage is critical in areas with high water tables, seepage zones, springs, porous soils, dolomite, or where surface water infiltrates the road foundation (Du Toit & Van Rooyen, 2002).

Compaction and Erosion Control

Compaction increases material density and is essential for road strength and durability. Road performance depends on soil type, compaction level, and moisture content, the latter two being controllable through proper construction practices. Mechanical rollers are commonly used to achieve adequate compaction (Du Toit & Van Rooyen, 2002).

Erosion control along road verges is vital. Topsoil, applied at a thickness of 75–100 mm, supports vegetation establishment and slope stabilisation. Slopes steeper than 1:4 require additional runoff control measures such as obstructions, stone packing, or plant material like hay or straw to reduce water and wind erosion.

Recommendations for Highlands Wilderness

Severe water runoff occurs on steep roads during the rainy season. Additional drainage trenches or pipes are recommended to prevent erosion, gully formation, and loss of road material. Firebreak roads along mountain fence lines should be regularly cleared and maintained to prevent the spread of fires to neighbouring properties. All roads require routine inspection and maintenance to address erosion, potholes, and steep gradients.

Major roads on Highlands Wilderness are generally well maintained and regularly graded. However, straight roads in the grassland management unit encourage speeding, increasing the risk to wildlife. The installation of soil speed humps at intervals of approximately 100 m is recommended. Mountain roads are steep and suitable only for 4×4 vehicles, and some pose safety risks for tourist game viewing due to rocky surfaces and reduced traction.